IS 9000-27 (1986): Basic environmental testing procedures for electronic and electrical items, Part 27: Ultrasonic cleaning test [LITD 1: Environmental Testing Procedure]

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Indian Standard

BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART 27 ULTRASONIC CLEANING TEST

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PART 27 ULTRASONIC CLEANING TEST

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*For the meeting in which this standard was recommended for finalization.

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BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART 27 ULTRASONIC CLEANING TEST

0. FOREWORD

0.1 This Indian Standard (Part 27) was adopted by the Indian Standards Institution on 27 June 1986, after the draft finalized by the Environmental Testing Procedures Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The differences in environmental testing procedures for component type items and equipment type items are fast disappearing in context of technological developments. It is, therefore, felt necessary to have uniform testing procedures wherever possible. This series of standards on environmental testing procedures (IS : 9000) has been prepared with this objective. This is also in line with the principle adopted by IEC/ TC 50 Environmental testing in developing unified series of standards on evironmental testing procedures by International Electrotechnical Commission.

0.3 This standard (Part 27) covers the test procedure for ultrasonic cleaning of electronic and electrical items. The guidance details for ultrasonic cleaning are covered in IS : 9001 (Part 18)-1986*.

0.4 This standard is based on IEC Pub 653(1979) 'General considerations on ultrasonic cleaning', issued by the International Electrotechnical Commission (IEC).

0.5 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to rounded off, it shall be done in accordance with IS : 2-1960†.

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*Guidance for environmental testing: Part 18 Ultrasonic cleaning test.
†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 27) covers the procedure for application of ultrasonic cleaning exposure test on electronic and electrical items as a part of the basic environmental testing procedures.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions and explanation of terms given in IS : 9000 (Part 1)-1977* shall apply.

3. OBJECT

3.1 The object of this test is to determine the ability of components and equipment to withstand the effects of ultrasonic cleaning under specified conditions.

4. GENERAL

4.1 Range of Application

a) Components which are to be ultrasonically cleaned when assembled in equipment, or in printed wiring or circuit boards—before and after soldering.

b) Equipment and sub-units which are to be cleaned during repair work.

4.2 Conditions for Testing

4.2.1 *Ultrasonic System*

a) Frequency	:	25 kHz or 40 kHz
b) Range of output power from generator	:	10 to 30 W/l
c) Type of modulation (where required), full-wave at	:	100 Hz or 120 Hz
d) Type of transducer	:	PZT (lead zirconate titanate)
e) Position of transducers	:	Distributed on bottom of tank
f) Preferred size of tank (approximate dimensions)	:	Length — 250 mm Width — 200 mm Depth — 180 mm

4.2.1.1 The tank shall have a provision to maintain the required temperature (*see* **5.1.4**).

*Basic environmental testing procedures for electronic and electrical items: Part 1 General.

4.2.2 *Mounting of Items*

4.2.2.1 *Components* — The electronic components under test shall be mounted on a printed wiring or circuit board or held individually in the liquid by suitable means, for example, by clips as prescribed by the relevant specification.

4.2.2.2 *Equipment* — The method of mounting shall be prescribed in the relevant specification.

5. SEVERITIES

5.1 The severities as indicated by frequency, output power, testing liquid and other data shall be specified in the relevant specification.

Values of other data shall be selected from those given in **5.1.1** to **5.1.4.**

5.1.1 *Frequencies* — The test shall be carried out at one or both of the following frequencies:

a) 25 ± 4 kHz

b) $40 \pm \frac{8}{4}$ kHz

However, 40 kHz is the preferred frequency.

5.1.2 *Duration* — 5 min.

5.1.3 *Immersion* — Complete.

5.1.4 *Testing Liquids* — Two preferred liquids are specified for this test:

a) De-ionized water at 50 ± 5°C; and

b) A solvent, 1,1,2-trichloro-1,2,2-trifluoroethane* at 30 ± 5°C.

For other liquids, suitable tests are to be agreed between the user and the manufacturer.

6. INITIAL MEASUREMENTS

6.1 The item shall be visually inspected and electrically and mechanically checked as prescribed in the relevant specification.

7. CONDITIONING

7.1 Positioning of the Item in the Tank — The item shall be completely immersed in the liquid. The liquid shall be at the specified temperature. The preferred height of the item above the bottom of the tank should be a half-wavelength or multiples of it, that is, situated

*Known for instance, as Freon TF or Arklone P.

in an antinode. This is recommended especially for small items, the disturbing effect of which on the spreading of the sound pressure can be neglected.

The total liquid depth shall be a multiple of a half-wavelength under the test conditions specified. Where components are mounted on a printed circuit or other assemblies, they shall face the radiating surface of the transducer.

7.2 Degassing — Before beginning the test, the liquid shall be degassed by switching the ultrasonic power on for 30 min. The temperature indicated in **5.1.4** shall not be exceeded.

7.3 Exposure — The items shall be exposed to ultrasonic power for a period of 5 min, unless otherwise prescribed in the relevant specification. The temperature specified in **5.1.4** shall be maintained during the test. When testing in a solvent, before removal from the tank, they shall be left in the vapour above the liquid for 30 s.

8. RECOVERY

8.1 At the end of this period, the item shall be stored at standard atmospheric conditions for testing for a period adequate for attaining the temperature stability and drying.

NOTE — In order to allow all residues of water or solvent to escape, the item may be left for 30 min at 55 ± 2°C (assisted drying) before being stored for recovery.

9. FINAL MEASUREMENTS

9.1 The item shall be visually inspected and electrically and mechanically checked as prescribed in the relevant specification.

10. INFORMATION TO BE GIVEN IN THE RELEVANT SPECIFICATION

10.1 When this test is included in the relevant specification, the following details shall be given as far as they are applicable:

a) Mounting of items in the tank (**4.2.2**),
b) Initial measurements (**6**),
c) Severities:
   1) Frequency [**4.2.1**(a)],
   2) Output power [**4.2.1**(b)],
   3) Modulation [**4.2.1**(c)],
   4) Testing liquid (**5.1.4**), and
d) Final measurements (**9**).